

Appendix C: Pedestrian Design Guidelines

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1.0 RATIONALE FOR THE DESIGN GUIDELINES

Designing streets so that they encourage people to walk by providing an experience that is safe, comfortable and attractive is an important element to creating vibrant and active urban areas. The purpose of the Pedestrian Design Guidelines is to integrate existing resources and current best practices into one coherent set of guidelines aimed at improving the pedestrian experience in Chula Vista. These guidelines are meant for inclusion in the City's Street Design Standards. They should be used by engineers, planners, policy makers, and the public to guide decisions related to new construction as well as retrofitting existing infrastructure.

The following guidelines recommended for use by the City of Chula Vista primarily address issues of pedestrian safety, and secondarily, issues of urban design, design character, and the many other amenities that make streets and sidewalks attractive places to travel and spend time as a pedestrian. It is clear that safety concerns can significantly influence a person's decision to walk or use other modes of transportation. Where people aren't walking, it is often because they are prevented or discouraged from doing so. Either the infrastructure is insufficient, has serious gaps, or there are safety hazards. These design guidelines present many design and infrastructure improvements that will help the City of Chula Vista to better accommodate pedestrians' needs and build a stronger walking community.

The guidelines included in this chapter are supplemental to the City of Chula Vista's currently adopted development policies, as well as State and Federal standards. **The purpose of this chapter is not to replace City standards, but to provide general design guidelines for pedestrian facilities that go above the minimum standards. Final design of any pedestrian facility should be conducted by a licensed engineer using sound engineering judgment, applicable standards and guidelines.**

2.0 STATE AND FEDERAL GUIDELINES

The design of many streetscape elements is regulated by state and federal law. Traffic control devices must follow the procedures set forth in the Manual of Uniform Traffic Control Devices (MUTCD), while elements such as sidewalks and curb cuts must comply with guidelines implementing the Americans with Disabilities Act (ADA).

Manual of Uniform Traffic Control Devices

The City of Chula Vista follows the procedures and policies set out in the CA MUTCD (state) and MUTCD (federal). Traffic control devices include traffic signals, traffic signs, and street markings. The manual covers the placement, construction, and maintenance of devices. The CA MUTCD emphasizes uniformity of traffic control devices to protect the clarity of their message. A uniform device conforms to regulations for dimensions, color, wording, and graphics and minimizes confusion or misunderstanding on the part of the roadway user. Uniformity also means treating similar situations in the same way.

Revised Draft Guidelines for Accessible Public Rights-of-Way

The Americans with Disabilities Act (ADA) is civil rights legislation that prohibits public entities from discrimination on the basis of disability. Under the ADA, state and local government facilities, public places, and commercial facilities must meet design requirements to ensure these facilities are accessible to

people with disabilities. The U.S. Access Board maintains three sets of guidelines that establish minimum accessibility standards: the Americans with Disability Act Accessibility Guidelines (ADAAG), Architectural Barriers Act (ABA) guidelines, and the Revised Draft Guidelines for Accessible Public Rights-of-Way. The City of Chula Vista utilizes the U.S. Access Board's Revised Draft Guidelines for Accessible Public Rights-of-Way for implementing accessibility standards within the public right-of-way. These draft guidelines are currently under public review. Although these guidelines have not been formally adopted, they represent the most current state-of-the-art with respect to accessibility in the public right-of-way. The guidelines were also written to apply to new construction. The extent to which they should be applied to major alterations and retrofits is still under review by the Access Board and Department of Justice (DOJ). These guidelines specifically pertain to the public right-of-way, whereas the ADAAG and ABA apply primarily to buildings and facilities standards. According to the Access Board, "While [the ADAAG and ABA] address certain features common to public sidewalks, such as curb ramps, accessible routes, ground and floor surfaces, and bus stop shelters, further guidance is necessary to address conditions unique to public rights-of-way". In addition to these federal guidelines, cities in California can refer to California Title 24 State Accessibility Standards, State Architectural Regulations for Accommodation of the Physically Handicapped in Public Facilities for accessibility guidelines.

3.0 PRINCIPLES OF PEDESTRIAN DESIGN

The following design principles represent a set of ideals which should be incorporated, to some degree, into every pedestrian improvement. They are ordered roughly in terms of relative importance.

- **The pedestrian environment should be safe.**
Sidewalks, walkways, and crossings should be designed and built to be free of hazards and to minimize conflicts with external factors such as noise, vehicular traffic, and protruding architectural elements.
- **The pedestrian network should be accessible to all.**
Sidewalks, walkways, and crosswalks should ensure the mobility of all users by accommodating the needs of people regardless of age or ability.
- **The pedestrian network should connect to places people want to go.**
The pedestrian network should provide continuous direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities and transit.
- **The pedestrian environment should be easy to use.**
Sidewalks, walkways, and crossings should be designed so people can easily find a direct route to a destination and will experience minimal delay.
- **The pedestrian environment should provide good places.**
Good design should enhance the look and feel of the pedestrian environment. The pedestrian environment includes open spaces such as plazas, courtyards, and squares, as well as the building facades that give shape to the space of the street. Amenities such as seating, street furniture, banners, art, plantings, shading, and special paving, along with historical elements and cultural references, should promote a sense of place.
- **The pedestrian environment should be used for many things.**

The pedestrian environment should be a place where public activities are encouraged. Commercial activities such as dining, vending, and advertising may be permitted when they do not interfere with safety and accessibility.

- **Pedestrian improvements should preserve or enhance the historical qualities of a place and the City.**

Chula Vista's history must be preserved in the public space. Where applicable, pedestrian improvements should restore and accentuate historical elements of the public right-of-way. Good design will create a sense of time that underscores the history of Chula Vista.

- **Pedestrian improvements should be economical.**

Pedestrian improvements should be designed to achieve the maximum benefit for their cost, including initial cost and maintenance cost as well as reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce, and connect with adjacent private improvements.

The remaining sections of this memorandum delineate pedestrian facility designs. A brief description, graphics, list of potential applications, and summary of standards is provided for each design type presented. Specific designs are organized into the following general topics:

- 4.0 Sidewalk Corridor Guidelines
- 5.0 Sidewalk Grade and Cross Slope
- 6.0 Curb Ramps
- 7.0 Railroad Crossings
- 8.0 Pedestrian Amenities
- 9.0 Crosswalks
- 10.0 Pedestrian Signage
- 11.0 Design Treatments for Crosswalks
- 12.0 Traffic Signal Enhancements
- 13.0 Pavement Markings
- 14.0 Transit Stops
- 15.0 Pedestrian Trails

4.0 SIDEWALK CORRIDOR GUIDELINES

The guidelines presented in this sidewalk corridor section apply to sidewalks in new development areas, redevelopment areas, and in areas where street reconstruction is planned.

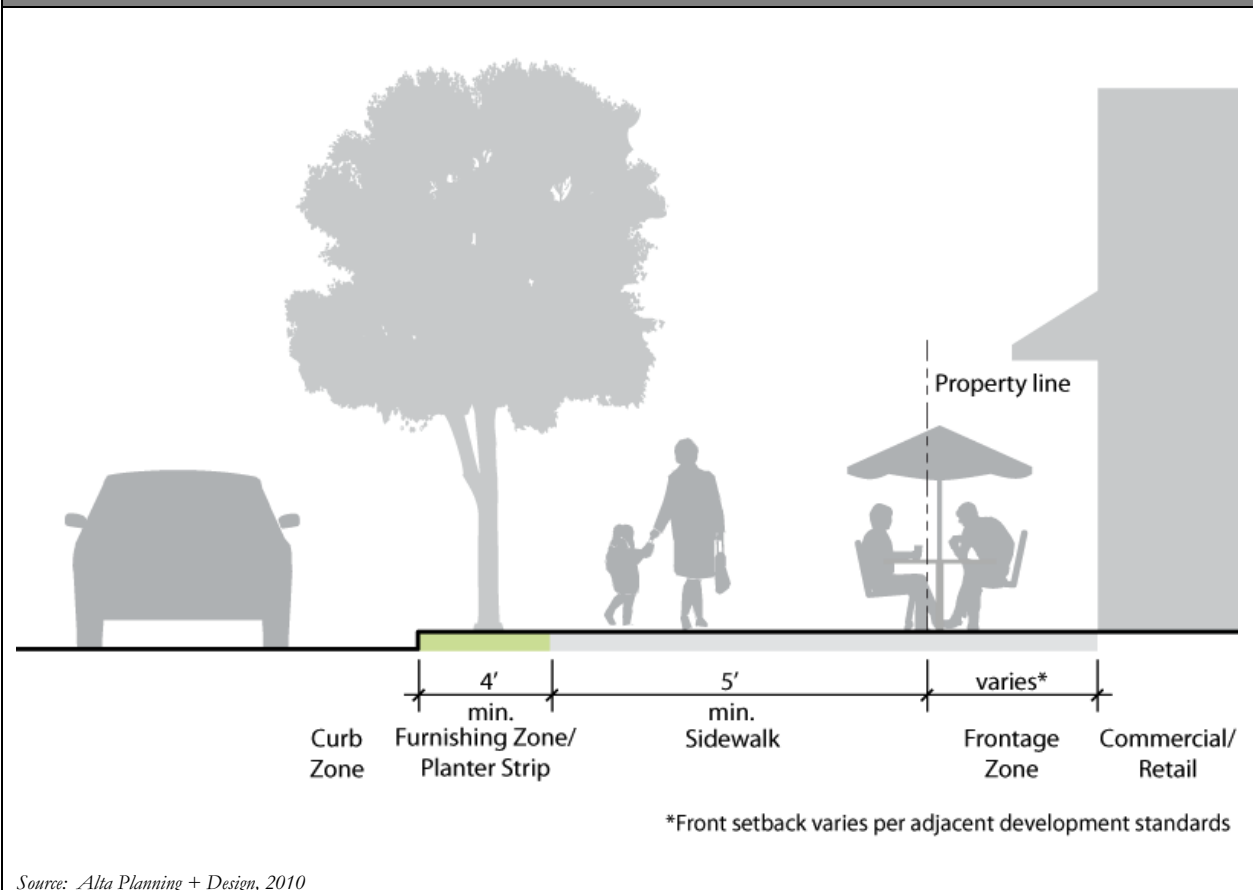
Proposed sidewalk corridor guidelines depend on available street width, motor vehicle volumes, surrounding land uses, and pedestrian activity levels. Standardizing sidewalk guidelines for different areas of the city ensures a minimum level of quality for all sidewalks.

4.1 Sidewalk Corridors - Urban Setting

Description

Sidewalks are the most important component of Chula Vista's pedestrian circulation network. Sidewalks provide pedestrian access to virtually every activity and provide critical connections between other modes of travel, including the automobile, public transit, and bicycles. The Sidewalk Corridor is located within the public right-of-way between the curb or roadway edge and the property line. The Sidewalk Corridor contains four distinct zones: the Curb Zone, the Furnishing Zone, the Through Pedestrian Zone, and the Frontage Zone as displayed in the following figure.

Graphic



Potential Applications

- Sidewalks in commercial zones with right-of way widths of approximately 80 feet, and sidewalk widths of approximately 15 feet.

Elements

Curb Zone

Curbs prevent water in the street gutters from entering the pedestrian space and discourage vehicles from driving over the pedestrian area. In addition, the curb helps to define the pedestrian environment within the streetscape. At the corner, the curb is an important tactile element for pedestrians who are finding their way with the use of a cane. Straight curbs rather than rolled curbs are strongly recommended because it eliminates the potential for cars to park on the sidewalk or partially obstructing the sidewalk.

Furnishing Zone

All streets require a utility zone to accommodate above ground public infrastructure, signage, and street trees. Locating this infrastructure in the Furnishing Zone prevents it from encroaching on the Through Pedestrian Zone, where it is likely to cause accessibility issues. The Furnishing Zone also creates an important buffer between pedestrians and vehicle travel lanes by providing horizontal separation. Elements like utility poles, sign posts, and street trees improve pedestrian safety and comfort by further separating the sidewalk from moving vehicles. Four feet is the minimum width for Furnishing Zones that include trees; six to eight feet is the preferred width for Furnishing Zones with trees. Additional guidelines for the Furnishing Zone are discussed in Section 4.2.

Through Pedestrian Zone

Many residential areas are low to medium density and therefore have low pedestrian volumes, compared to more urban areas. A five foot Through Pedestrian Zone is recommended for these conditions. Some commercial areas, school zones, and other public areas generate greater pedestrian volumes where a wider than five foot through zone should be considered. The Through Pedestrian Zone provides the minimum clear width required for safe pedestrian movement. The minimum continuous and unobstructed clear width of a pedestrian route, including along sidewalks, is four feet

Frontage Zone

The Frontage Zone is the space between the Through Pedestrian Zone and the adjacent property line. Pedestrians tend to avoid walking close to barriers at the property line, such as buildings, storefronts, walls or fences, in the same way that they tend to avoid walking close to the roadway. In most cases the Frontage Zone should be at least 12 inches. However, if the sidewalk is adjacent to a wide open or landscaped space, such as in residential areas where fences are not typically found or not allowed, the Frontage Zone can be eliminated. Guidelines for Frontage Zones are presented in Section 4.4. A Frontage Zone may not be required in some residential areas of Chula Vista with deep front yard setbacks.

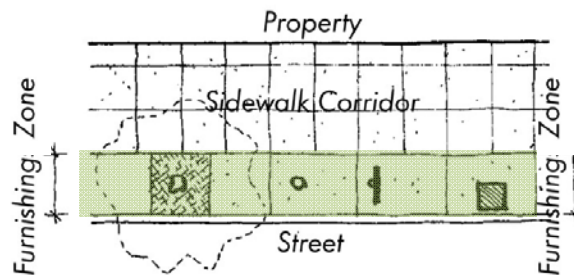
The Furnishing Zone, Through Pedestrian Zone, and Frontage Zone are discussed in further detail in the subsequent sections.

4.2 Furnishing Zone

Description

The Furnishing Zone buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, utility poles, street lights, controller boxes, hydrants, signs, parking meters, driveway aprons, grates, hatch covers, and street furniture are properly located. This is the area where people alight from parked cars. The Furnishing Zone could include street trees if it is at least four feet wide. In commercial areas, this zone may be paved, with tree wells and planting pockets for trees, flowers, and shrubs. In other areas, this zone generally is not paved except for access walkways, but is landscaped with some combination of street trees, shrubs, ground cover, lawn, or other landscaping treatments.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- All roads with sidewalks
- Especially important on streets where traffic is heavy and traffic speeds are over 35 mph (55 km/h)

Summary of Standards and Elements

- Minimum Furnishing Zone width is four feet if street trees are included.
- Six to eight feet is the preferred width for Furnishing Zones with trees.

Grates

All grates within the sidewalk should be flush with the level of the surrounding sidewalk surface, and should be located outside the Through Pedestrian Zone. Ventilation grates and tree well grates should have openings no greater than 1/2 in (13 mm) in width. Designers should use tree well grates in High Pedestrian Use areas.

Access Hole Covers

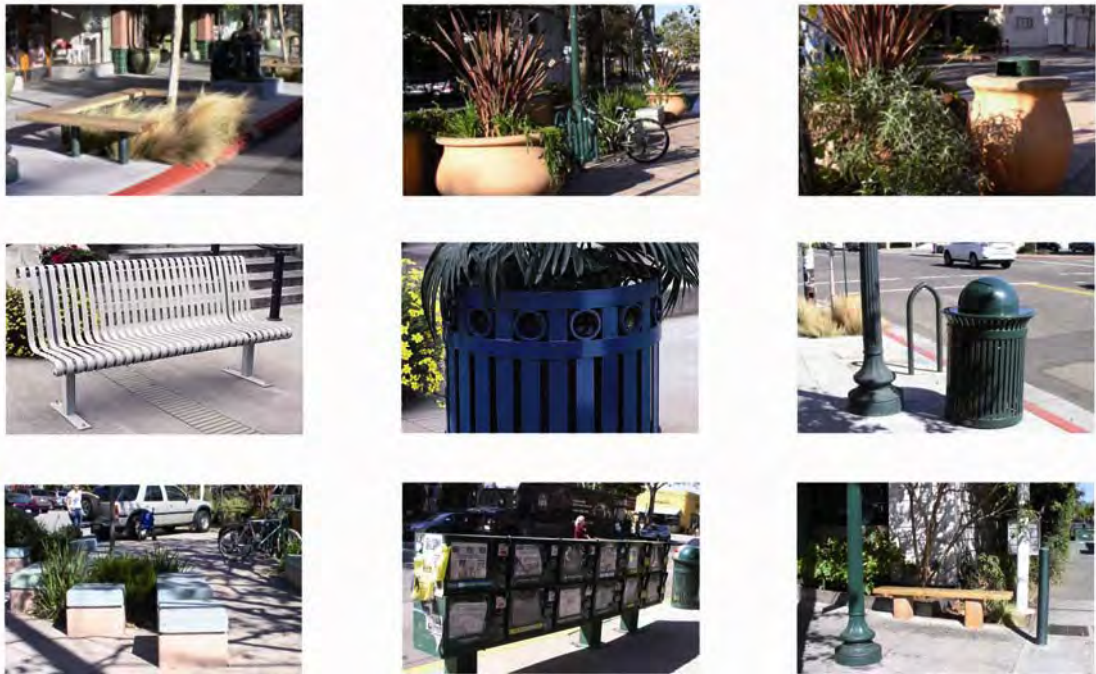
Access hole covers should be located within the Furnishings Zone. Access hole covers must have a surface texture that is rough, with a slightly raised pattern. The surface should be slip-resistant even when wet. The cover should be flush with the surrounding sidewalk surface.

Street Furniture

Street furniture includes benches, mailboxes, trash and recycling receptacles, bike racks, newspaper boxes, drinking fountains, information boards, kiosks, parking meters, artwork, public phones, signs, bus shelters, and other items used by pedestrians. These features humanize the scale of a street and encourage pedestrian activity. Street furniture should be placed in the furnishings zone to maintain through passage zones for pedestrians and to provide a buffer between the sidewalk and the street.

Utility Poles and Structures

The City's underground and overhead network of utility services greatly impacts sidewalks. Utility poles, traffic signals, and fire hydrants should be installed outside the Through Passage Zone. Whenever possible, electrical boxes should be located on utility, traffic signal or light poles (space permitting) so they do not create unexpected hazards to pedestrians. Utility vaults and access boxes should be located outside the Through Passage Zone and be constructed from non-slip materials that are flush with the sidewalk, in conformance with ADA requirements.



Examples of Street Furniture

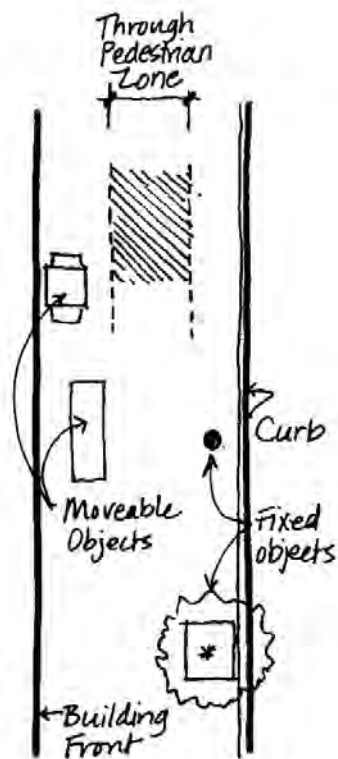
4.3 Through Pedestrian Zone

Description

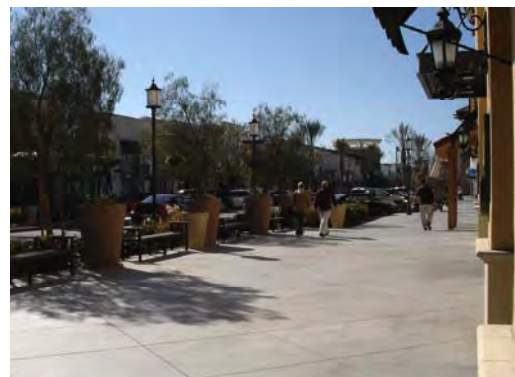
The Through Pedestrian Zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects. For sidewalk infill projects in areas with some existing sidewalks, the new sidewalk should match the existing width or meet the recommended width whichever is larger. Driveway aprons should not intrude into the Through Pedestrian Zone.

The US Access Board Revised Draft Guidelines for Accessible Public Rights-of-Way specifies that the minimum clearance required for through passage is 48 inches, but may be reduced to 44 inches for vertical obstructions between 27 and 80 inches above the surface of the pedestrian access route.

Graphics



Source: Alta Planning + Design, 2010



The Through Pedestrian Zone is the area of the Sidewalk Corridor intended for pedestrian travel

Potential Applications

- All sidewalks

Summary of Standards

The City of Chula Vista currently requires, at minimum, five foot wide sidewalks paved with Portland Cement Concrete (CVMC 18.32.090). These dimensions conform to the US Access Board Revised Draft Guidelines for Accessible Public Rights-of-Way that calls for a minimum of four foot wide continuous, unobstructed pedestrian access routes.

Walkways narrower than five feet in clear width must provide five foot wide passing spaces for a distance of five feet at intervals of 200 feet maximum (U.S. Access Board, Revised Draft Guidelines for Accessible Public Rights-of-Way, 2005).

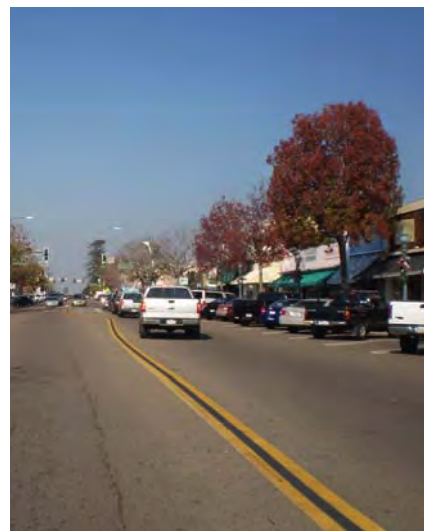
4.4 Frontage Zone

Description

The Frontage Zone is the area between the Through Pedestrian Zone and the property line. This zone allows pedestrians a comfortable “shy away” distance from the building fronts, in areas where buildings are at the lot line, or from elements such as fences and hedges on private property.

Where no Furnishing Zone exists, elements that would normally be sited in that zone, such as transit shelters and benches, telephone kiosks, signal and street lighting poles and controller boxes, traffic and parking signs, and utility poles, may occupy the Frontage Zone. In some cases, easements or additional right-of-way may be required to allow for these items. For residential and mixed-use building built to the right-of-way line, these elements should not be sited in the Frontage Zone, as they could block access to an existing or future building. Private temporary uses such as sidewalk cafes (where allowed by Code) may occupy the Frontage Zone, so long as the Through Pedestrian Zone is maintained.

Graphic



Many businesses along 3rd Avenue in Chula Vista provide awnings in the Frontage Zone.

Summary of Standards

The ten-foot wide right-of-way behind the face of curb includes areas for utility boxes, either between the sidewalk and property line for contiguous sidewalks or within the parkway or behind the sidewalk within utility easements for non-contiguous sidewalks.

Objects projecting from walls that have leading edges between 27 inches and 80 inches should not protrude more than 4 inches into pedestrian passage ways (U.S. Access Board, Revised Draft Guidelines for Accessible Public Rights-of-Way, 2005).

Encroachments into the public right-of-way for private purposes by abutting property owners are authorized in certain circumstances when the encroachment does not obstruct pedestrian traffic. The City Engineer is authorized to issue encroachment permits for fences and retaining walls, in accordance with zoning and building codes, not to exceed five feet in height. The Director of Public Works may

also permit temporary encroachments in the public right-of-way through an application and fee process (MC 12.28.030).

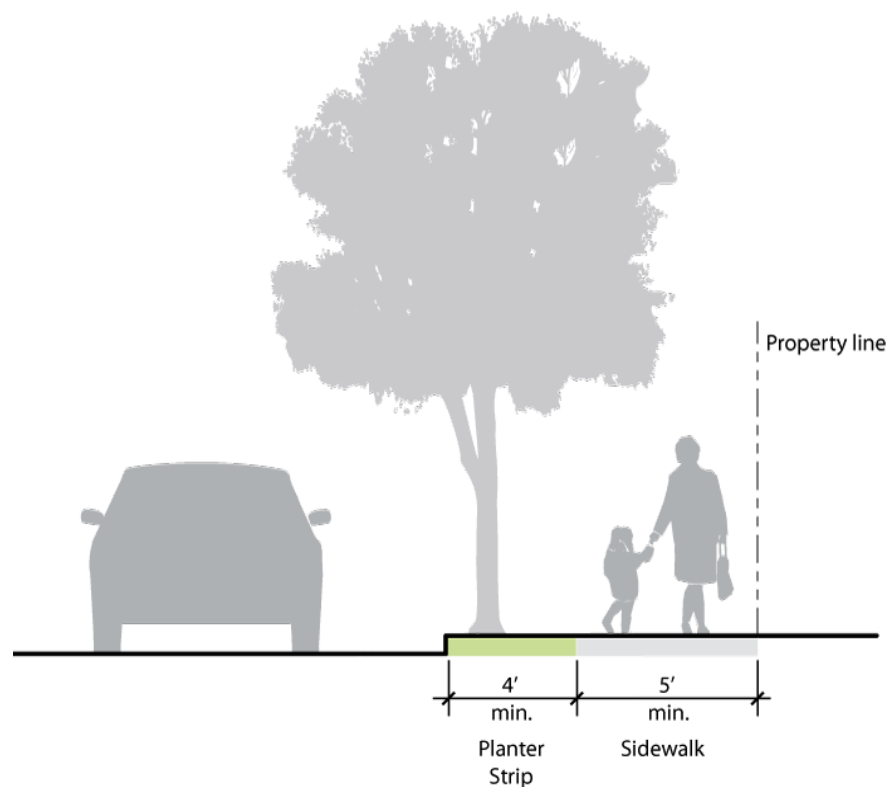
Awnings, canopies, and other accessory shade structures along with planters are permissible and desirable, provided that they do not restrict pedestrian movement.

4.5 Sidewalk Corridors - Residential Setting

Description

Residential sidewalks are generally narrower than commercial zone sidewalks, and priority should be given to the Through Pedestrian Zone's width in residential sidewalk design. Residential sidewalks do include the other sidewalk zones, such as for placement of utility boxes in the Furnishing Zone, yet these zones are less prominent than in commercial or mixed use areas where Furnishing and Frontage Zones may feature ample seating and amenities like newsstands.

Graphic



Source: Alta Planning + Design, 2010

Dimensions given for ROW 50 feet or less

Potential Applications

- Residential areas with right-of-way widths of approximately 50 feet, and sidewalk widths of approximately 10 feet.

Summary of Standards

- Minimum sidewalk width should be five feet.
- If established sidewalks are less than five feet wide and no additional right-of-way is available, the Frontage Zone should be eliminated in the interest of preserving a Through Pedestrian Zone, with the remaining Furnishing and Curb Zones functioning as a buffer between pedestrians and the street.
- Minimum clearance required for through passage is 48 inches, but may be reduced to 44 inches for vertical obstructions between 27 and 80 inches above the surface of the pedestrian access route (U.S. Access Board, Revised Draft Guidelines for Accessible Public Rights-of-Way, 2005).

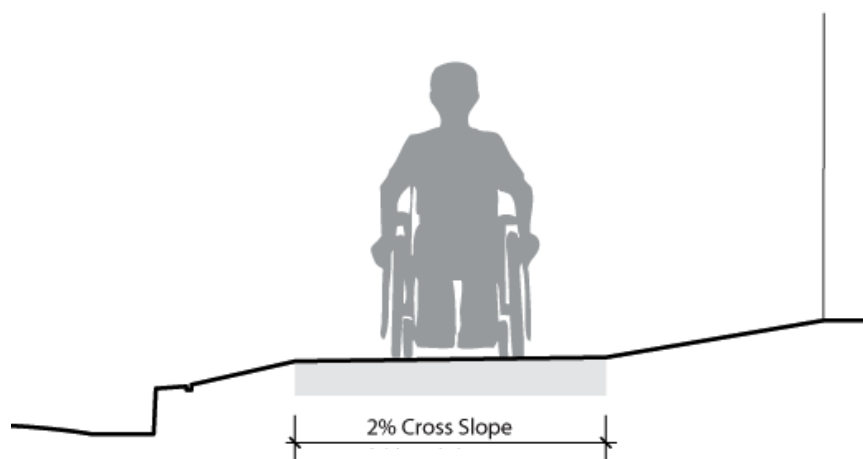
5.0 SIDEWALK GRADE AND CROSS SLOPE

Description

Making sidewalks and trails ADA compliant ensures that the grade and the cross slope of the sidewalk or trail are safe for disabled users. Gentle grades are preferred to steep grades due to issues of control, stability and endurance. The cross slope is significant for issues of control, not only for wheelchair users, but for those with difficulty walking as well.

Grade is the slope parallel to the direction of travel. Running grade is the average grade along a continuous path. Counter slope is the grade running opposite to the running grade.

Graphic



Source: Alta Planning + Design, 2009

Potential Applications

- All sidewalks, especially those on uneven or steep terrain.

Summary of Standards

The required cross slope for sidewalks is 2 percent (1:50). If a greater slope is anticipated because of unusual topographic or existing conditions, the designer should maintain the preferred slope of 1:50 within the entire Through Pedestrian Zone, if possible.

Longer, steeper grades should have landings every 400 feet where people can rest. Maximum grade covers a limited section of sidewalk that exceeds the running grade. It is measured over 24 in (0.610 m). The rate of change of grade is the change of grade over a distance of 24 in (0.610 m) intervals.

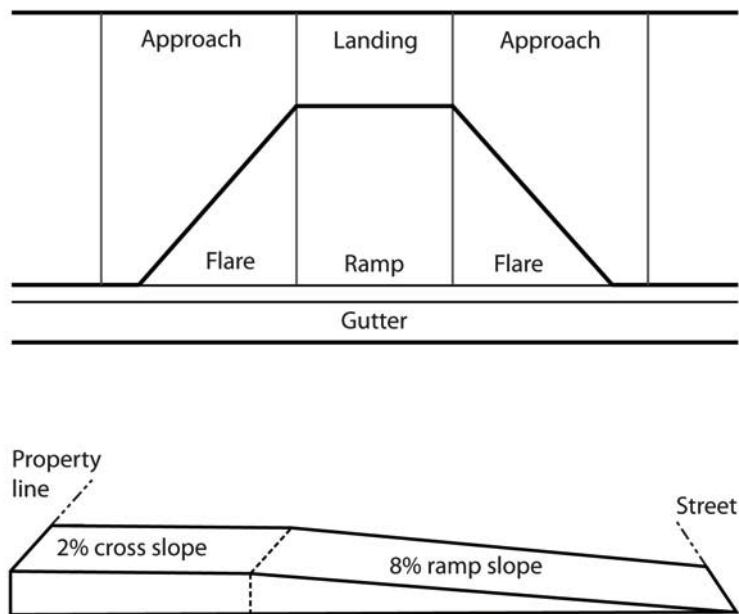
New sidewalks must be built to comply with these grade requirements and approval of the City Engineer. However, in a steep area with existing roadways, exceptions are allowed. Staircases and/or elevators can provide an alternative.

6.0 CURB RAMPS

Curb ramps are necessary for people who use wheelchairs to access sidewalks and crosswalks. ADA regulations require the installation of curb ramps in new sidewalks, as well as retrofitting existing sidewalks. Curb ramps may be placed at each end of the crosswalk (perpendicular curb ramps), or between crosswalks (diagonal curb ramps). Curb ramps should be oriented to direct pedestrians to the opposite corner and to provide a direct connection between the sidewalk and the crosswalk. Curb ramps should be designed such that wheelchair users can transition from the sidewalk to the crosswalk without having to enter travel lanes. The ramp may be formed by drawing the sidewalk down to meet the street level, or alternately building up a ramp to meet the sidewalk. New curb ramps must comply with the requirements of the Americans with Disabilities Act Accessibility Guidelines.

Two common curb ramp designs, perpendicular and diagonal, and the situations in which each should be used, are described in Sections 6.2 and 6.3. **Table 6-1** provides a comparison of various accessible curb ramp design standards, including parallel and curb extensions.

6.1 ADA Curb Ramp Components and Slope

Description
The main components of curb ramps are the landing, approach, flare, ramp and gutter, and are necessary to provide a gentle transition between the curb and sidewalk. Various ramp designs may be used to regulate the slope of the ramp.
Graphic
 <p>The graphic consists of two diagrams. The top diagram is a cross-section of a curb ramp. It shows a sidewalk on the left, a curb, and a street on the right. The sidewalk is divided into three sections: 'Approach' (a flat section), 'Landing' (a flat section), and 'Approach' (a flat section). The curb is a vertical line. The street is a horizontal line. The ramp is a sloped section between the sidewalk and the street. The ramp is divided into three sections: 'Flare' (a sloped section), 'Ramp' (a sloped section), and 'Flare' (a sloped section). The gutter is the space between the curb and the street. The bottom diagram is a side view of a curb ramp. It shows a 'Property line' on the left and a 'Street' on the right. The sidewalk is a horizontal line. The ramp is a sloped section. The gutter is a horizontal line. The ramp is divided into two sections: '2% cross slope' (a sloped section) and '8% ramp slope' (a sloped section).</p>
<i>Source: Alta Planning + Design, 2009</i>

Potential Applications

- All intersections.
- Midblock crossings.
- Multi-use trail and roadway intersections

Details

Curb ramps should be designed to accommodate the level of use anticipated at specific locations, with sufficient width for the expected level of peak hour pedestrian volumes and other potential users. Adequate drainage should be provided to prevent flooding of curb ramps. Tactile strips must be used to assist sight-impaired pedestrians in locating the curb ramp. The following list presents definitions of the main components of curb ramps:

Landing: The level area at the top of a curb ramp facing the ramp path. Landings allow wheelchairs to enter and exit a curb ramp, as well as travel along with sidewalk without tipping or tilting.

Approach: The portion of the sidewalk on either side of the landing. Approaches provide space for wheelchairs to prepare to enter landings.

Flare: The sloped transition between the curb and sidewalk. Flares provide a sloped transition between the sidewalk and curb ramp to help to prevent pedestrians from tripping over an abrupt change in level.

Ramp: The sloped transition between the sidewalk and street where the grade is constant and cross slope at a minimum. Ramps are the main pathway between the sidewalk and street.

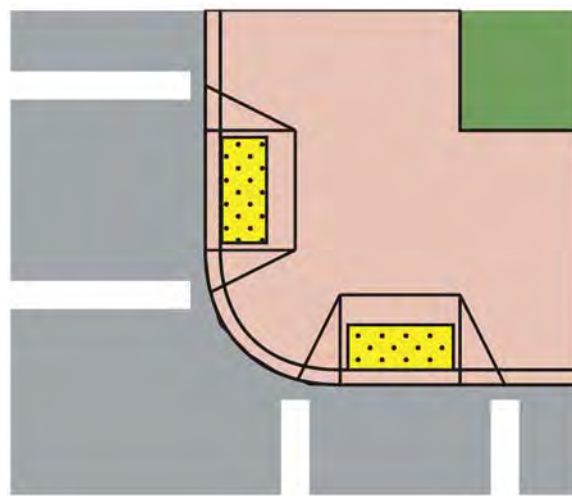
Gutter: The trough that runs between the curb or curb ramp and the street, designed to serve as a conduit for storm water flow or other drainage.

6.2 Perpendicular Curb Ramps

Description

Perpendicular curb ramps are preferred because they allow for a convenient, direct path of travel with a 90-degree angle to the curb. Perpendicular curb ramps are oriented such that users enter the street traveling perpendicular to vehicular traffic. Perpendicular curb ramps maximize access for pedestrians at intersections. They reduce the overall distance required to cross the street when compared with diagonal ramps. However, perpendicular curb ramps require more space than single diagonal ramps.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- All intersections.
- Multi-use trail and roadway intersections.

Summary of Standards

Perpendicular curb ramps should be used at large intersections. Curb ramps should be aligned with crosswalks, unless they are installed in a retrofitting effort and are located in an area with low vehicular traffic.

The minimum width of a curb ramp should be 48 inches per the Revised Draft Guidelines for Accessible Public Rights-of-Way.

Perpendicular curb ramps without level landings are difficult for wheelchairs to negotiate, and should not be installed. Where sidewalks are narrow, there may not be space for two perpendicular curb ramps and their landings. Adding curb extensions can create additional space to accommodate two perpendicular ramps and landing areas.

Truncated dome panels shall be a minimum of two feet (24 inches) in the direction of the ramp and the width shall be the full width of ramp, excluding ramp flares.

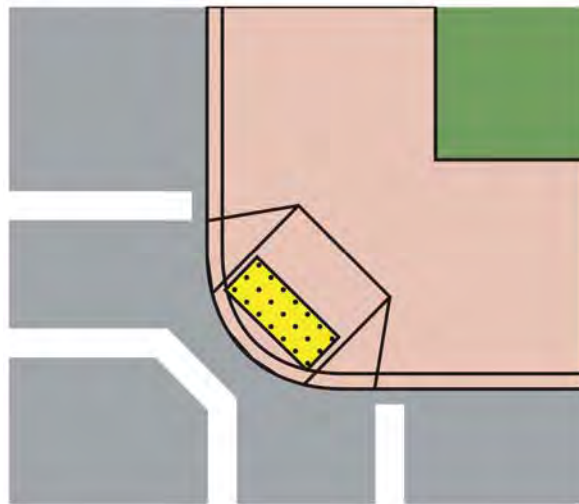
6.3 Diagonal Curb Ramps

Description

Diagonal curb ramps are usually similar in design to perpendicular curb ramps, but are placed at the apex of the corner and oriented such that users enter the street traveling diagonally to the path of vehicle travel. Diagonal curb ramps require less space than dual perpendicular curb ramps, but also require users to take a longer, circuitous travel path to the other side than a perpendicular ramp. They cause the user to travel towards the center of the intersection before maneuvering left or right to cross the street.

Diagonal curb ramps cost less than perpendicular ramps since they are single ramps, and hence the City can install more diagonal curb ramps than perpendicular curb ramps.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- Diagonal curb ramps are generally desirable on streets with little motor vehicle traffic where the advantage of installing more curb ramps compensates for the drawbacks.

Summary of Standards

- The minimum width of a curb ramp should be four feet wide (48 inches), with a clear space outward of 5' according to City standards
- Truncated dome panels shall be a minimum of two feet (24 inches) in the direction of the ramp and the width shall be the full width of ramp, excluding ramp flares.

Table 6-1
Comparison of Minimum Curb Ramp Dimensions

Curb Ramp Type	Characteristic	ADAAG Standards	US Access Board Guidelines	Title 24 Standards	Notes
Perpendicular Diagonal	Maximum slope of ramps	8.33%; if space prohibits this, 8.33% to 10% with a maximum rise of 150 mm (6 in); or 10% to 12.5% with a maximum rise of 75 mm (3 in)	7.1% + or – 1.2%		
	Maximum cross-slope of ramps	2%			
	Maximum slope of flared sides	10%			
	Minimum ramp width	0.915 m (36 in)	1.22 m (48 in)	1.22 m (48 in)	
	Minimum landing length	0.915 m (36 in); if landing is less than 1.22 m (48 in)			
	Minimum landing width		1.22 m (48 in)		
	Maximum gutter slope		5%		Gutter should be designed to not retain water
	Changes in level		flush		
	Truncated domes		610 mm (24 in)		
	Maximum slope of ramps	8.33%; if space prohibits this, 8.33% to 10% with a maximum rise of 150 mm (6 in); or 10% to 12.5% with a maximum rise of 75 mm (3 in)			
	Maximum cross-slope of ramps	2%			
	Maximum slope of flared sides	10%			
	Minimum ramp width	0.915 m (36 in)	1.22 m (48 in)	1.22 m (48 in)	
	Minimum landing length	0.915 m (36 in); if landing is less than 1.22 m (48 in)			
	Minimum landing width		1.22 m (48 in)		
	Maximum gutter slope		2%		Gutter should be designed to not retain water
	Changes in level		none		
	Minimum clear space		1.22 m (48 in)		
Parallel and combination	Maximum slope of ramps	8.33%; if space prohibits this, 8.33% to 10% with a maximum rise of 150 mm (6 in); or 10% to 12.5% with a maximum rise of 75 mm (3 in)	7.1%		
	Maximum cross-slope of ramps	2%			
	Maximum slope of flared sides	10%			
	Minimum ramp width	0.915 m (36 in)	1.22 m (48 in)	1.22 m (48 in)	
	Minimum landing length	0.915 m (36 in); if landing is less than 1.22 m (48 in)			
	Minimum landing width		1.22 m (48 in)		
	Maximum landing slope		2%		
	Maximum gutter slope		5%		Gutter should be designed to not retain water
	Changes in level		none		

Table 6-1
Comparison of Minimum Curb Ramp Dimensions

Curb Ramp Type	Characteristic	ADAAG Standards	US Access Board Guidelines	Title 24 Standards	Notes
	Truncated domes (parallel); detectable warnings (combination)		610 mm (24 in minimum in the direction of the ramp and the full width of the ramp excluding flares in the public right-of-way)		
Curb extensions and built-up curb ramps	Maximum slope of ramps	8.33%; if space prohibits this, 8.33% to 10% with a maximum rise of 150 mm (6 in); or 10% to 12.5% with a maximum rise of 75 mm (3 in)	7.1% + or – 1.2% (curb ext.); 7.1% (built-up)		
	Maximum cross-slope of ramps	2%	2% + or – 0.9% (curb ext.); 2% (built-up)		
	Maximum slope of flared sides	10%			
	Minimum ramp width	0.915 m (36 in)	1.22 m (48 in)	1.22 m (48 in)	
	Minimum landing length	0.915 m (36 in); if landing is less than 1.22 m (48 in)			
	Minimum landing width		1.22 m (48 in)		
	Maximum gutter slope		5%		Gutter should be designed to not retain water
	Changes in level		flush (curb ext.); none (built-up)		
	Detectable warnings		610 mm (24 in minimum in the direction of the ramp and the full width of the ramp excluding flares)		

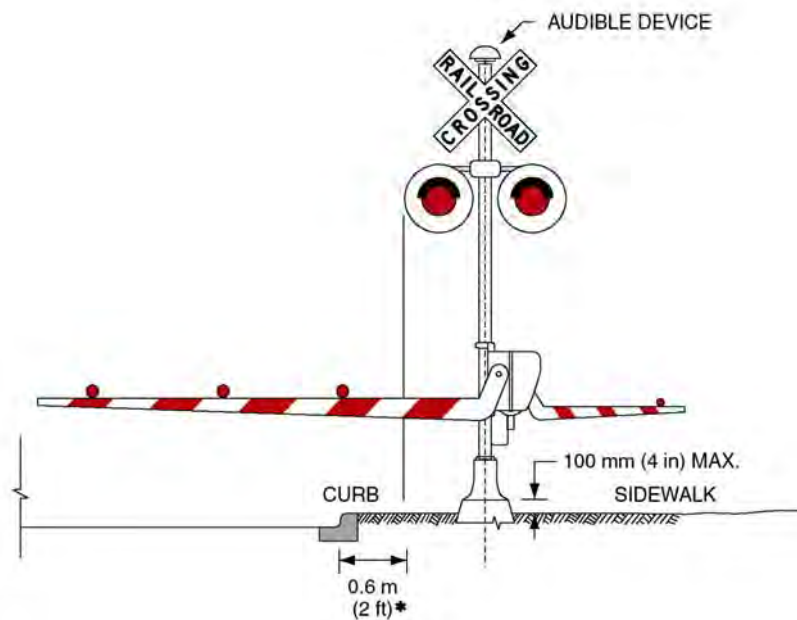
Source: ADA Accessibility Guidelines for Buildings and Facilities (ADAAG); California Code of Regulations (CCR), Title 24; Revised Draft Guidelines for Accessible Public Rights-of-Way (US Access Board, 2005).

7.0 RAILROAD CROSSINGS

Description

At-grade railroad tracks can be hazardous for pedestrians to cross. Improvements can be made to alert pedestrians that they are crossing tracks and that there is an oncoming train. Truncated domes help alert pedestrians as they are walking to cross the tracks with some caution. There are also other improvements that can help warn pedestrians of railroad crossings, such as signage. Railroad crossing warning signs can be placed near the sidewalk/railroad crossing. Another improvement is an arm that crosses the sidewalk when a train is approaching like arms that lower to stop vehicles approaching at-grade crossings.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- All sidewalks with at-grade rail crossings.

8.0 PEDESTRIAN AMENITIES

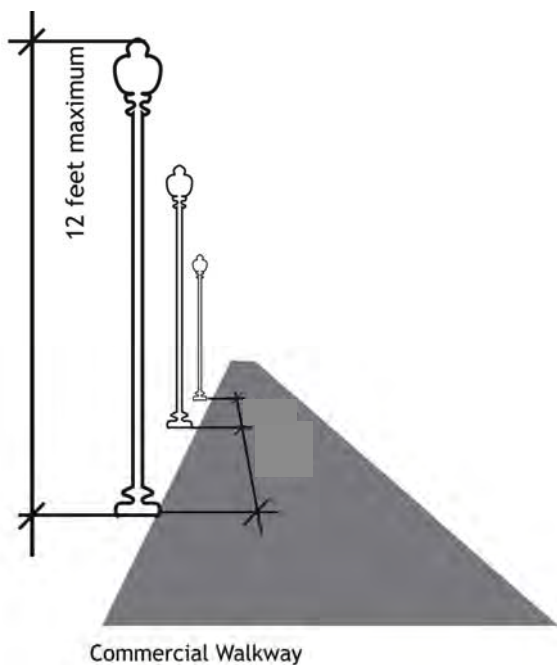
8.1 Sidewalk Lighting

Description

Improving street lighting makes locations appear more inviting and will encourage people to use pedestrian areas at night; which in turn, deters criminal activity.

Street lighting is designed to serve a variety of purposes. Some designers use lamp styles to provide a sense of neighborhood continuity or preserve the atmosphere of an historic district. Others use lights to improve visibility for motorists at a particular intersection. From the pedestrian's point of view, frequent lampposts of lower height and illumination are preferred over fewer lampposts that are taller and brighter.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- Use in areas of high pedestrian activity, such as the Village and Urban Core, where feasible based on available right of way, utilities and cost.
- Districts with active evening use such as entertainment districts, theatres, restaurants and parks such as the Village and Urban Core.

Summary of Standards

The Urban Core Specific Plan design guidelines recommend light fixtures above the minimum one foot-candle illumination, that are attractive and complimentary to surrounding architecture, be used to provide illumination around parking lots, vehicle driveways, pedestrian paths, plaza areas, and other activity areas.

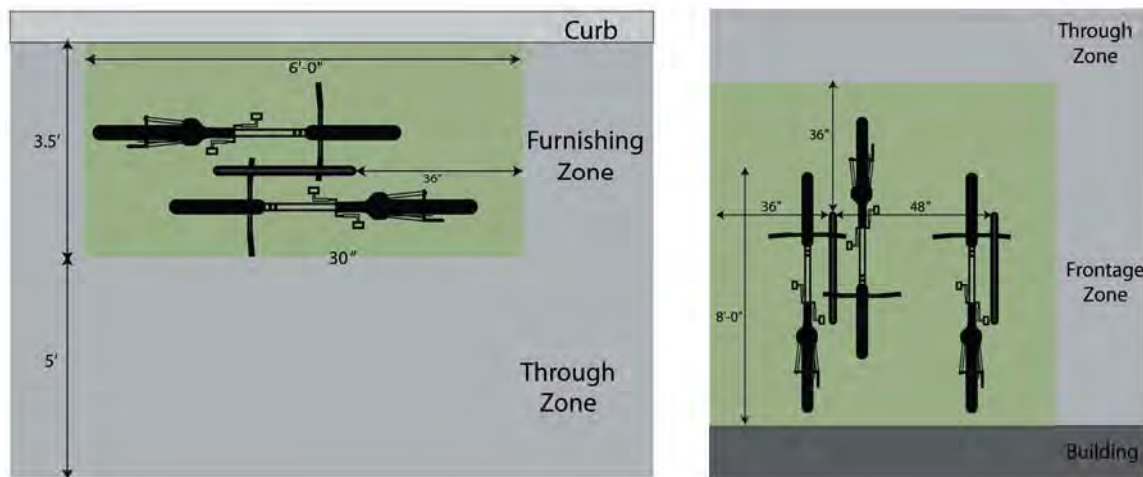
The City has no standard for spacing pedestrian-scale lights however 40 to 60 feet apart is typical spacing.

8.2 Bicycle Parking

Description

Many errands are multi-modal, involving walking and some other transport including vehicles, transit, or bicycle. Placing bicycle parking adjacent to store fronts, shopping centers or post offices may encourage people to bicycle to places that are too far to walk and too close for driving. To facilitate walking-bicycling trips, bicycle parking spaces can be installed in any of the zones identified except the sidewalks' Through Passage Zone.

Graphics



Source: Alta Planning + Design, 2010

Potential Applications

- Furnishing Zone of sidewalk
- Frontage Zone of sidewalk. Private property owners are encouraged to provide bicycle parking for use by the public on their land within the sidewalks' Frontage Zone.

Summary of Standards

- On narrow sidewalks, bicycle parking is oriented so the locked bicycle is parallel to the pedestrian traffic flow.
- Installed in the Curb Zone, racks must be a minimum of 3.5 feet from the curb and cannot obstruct the path of travel.
- On streets with larger right-of-way, bicycle parking may be oriented with locked bicycles perpendicular to the right-of-way as long as they do not project into the sidewalks' Through Passage Zone.

9.0 CROSSWALKS


At intersections, a crosswalk is effectively a legal extension of the sidewalk across the roadway. Crosswalks are present at all intersections, whether marked or unmarked, unless the pedestrian crossing is specifically prohibited by the City of Chula Vista. At mid-block locations, crosswalks only exist if they are marked.

According to the California MUTCD, crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops. Crosswalk markings also serve to alert road users of a pedestrian crossing point across roadways not controlled by highway traffic signals or STOP signs. At non-intersection locations, crosswalk markings legally establish the crosswalk.

As noted in the FHWA report “Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations,” the California MUTCD does not provide specific guidance relative to the site condition (e.g., traffic volume, pedestrian volume, number of lanes, presence or type of median) where marked crosswalks should or should not be used at uncontrolled locations. Nor does the MUTCD give specific guidance on the application of crosswalk enhancement features such as high-visibility striping, advanced warning signage, or flashing beacons. While the California MUTCD allows the use of these devices, decisions on their specific applicability to a given location have historically been left to the judgment of the local traffic engineers.

9.1 Crosswalk Placement and Markings

Description
<p>The City of Chula Vista’s standard crosswalk style is the “transverse” crosswalk, consisting of two parallel lines. Crosswalks should extend across the full width of intersections, or to the edge of the intersecting crosswalk, to encourage pedestrians to cross perpendicular to the flow of traffic. Crosswalk markings can be applied with paint, or thermoplastic. At controlled crosswalk locations (STOP signs or traffic signals), crosswalk markings by themselves are considered sufficient treatment, given the presence of a traffic control to stop vehicles. At uncontrolled crosswalk locations (either uncontrolled intersections or mid-block locations), marked crosswalks can be enhanced with crosswalk signage, advance warning signage or flashing beacons.</p> <p>The decision on whether to install standard or ladder crosswalk markings depends upon a variety of factors such as the number of pedestrians crossing, traffic speeds/volumes, number of lanes to cross, presence of nearby schools or senior centers, and history of collisions. In general, standard transverse markings are considered appropriate at controlled intersections, minor uncontrolled intersections, and other crossing locations with low traffic volumes/speeds, short crossing distance, and good visibility. High visibility ladder markings are generally applied at uncontrolled or midblock locations, especially on major streets with high pedestrian volumes, heavy traffic volumes and speeds, and more than one lane each direction.</p>

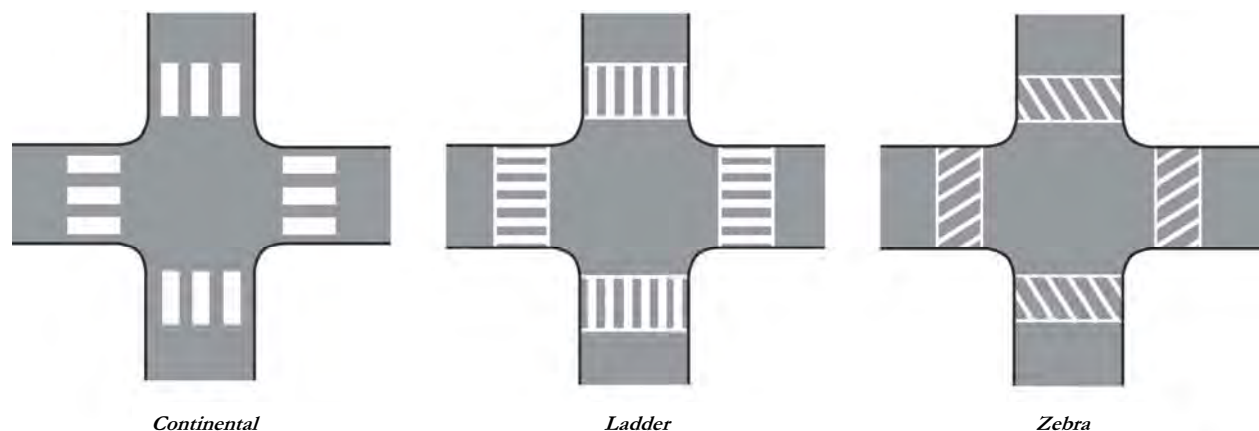
Graphic	Potential Applications
 <p><i>Standard crosswalk in Chula Vista</i></p>	<ul style="list-style-type: none"> • All intersections with significant pedestrian travel, including those near schools, signalized, or STOP-controlled intersections.
Summary of Standards	
<ul style="list-style-type: none"> • The width of crosswalks should be a minimum of 10 feet wide between inner crosswalk line edges. • Crosswalk lines are 12” solid white (or yellow within school zones). 	

9.2 Crosswalk Striping at High-Volume Intersections

Description

Chula Vista uses “zebra” or “ladder” crosswalks in activity areas where safety concerns are especially high, such as around schools. In general, crosswalks at intersections should be striped in a manner that alerts motorists to the presence of pedestrians. The striping pattern should reflect the level of pedestrian traffic and location of the crosswalk. Ladder crosswalks should be used in high-traffic pedestrian areas, while crosswalks with parallel line striping should be used at low-traffic residential intersections. Parallel line striping should be adequate for most signalized or stop controlled intersections, although ladder striping may be used if necessary (for example, if the site has a history of pedestrian collisions).

Graphics



Source: Alta Planning + Design, 2009

Potential Applications

- All high-volume intersections with pedestrian traffic

Summary of Standards

- In locations with significant pedestrian activity, four or five mid-block crossings are present per one street block (1320 feet wide) and may include high visibility striping.
- The stripes in parallel pavement marking crosswalks should be placed 10 feet apart. In situations where the crosswalk must be narrower, the minimum distance for parallel striping is 6 feet apart. Ladder pavement markings should measure 2 foot wide by 10 foot long bars.

9.3 Crosswalk Markings in School Zones

Description

Crosswalks within the designated school zone must be differentiated with yellow rather than white striping according to California MUTCD standards, to alert motorists to the presence of schools. The City of Chula Vista actively seeks funding, including Safe Routes to School grants, to make infrastructure improvements surrounding elementary schools. School safety enhancement projects include high visibility yellow zebra crosswalks as well as offset medians, curb extensions, setback limit lines, and ADA-compliant pedestrian ramps and non-slip sidewalk grating.

Graphics



Crosswalk in School Zone

Potential Applications

- School zones (up to 500' in advance of the school property line)

Summary of Standards

- Crosswalks can be striped as yellow standard traverse or yellow ladder or zebra crosswalks. Ladder or zebra crosswalks are preferred, particularly surrounding schools in areas with higher traffic volumes.
- Special signage should also be located near school crossings in accordance with the guidelines provided in Chapter 7 of the California MUTCD.

10.0 PEDESTRIAN SIGNAGE

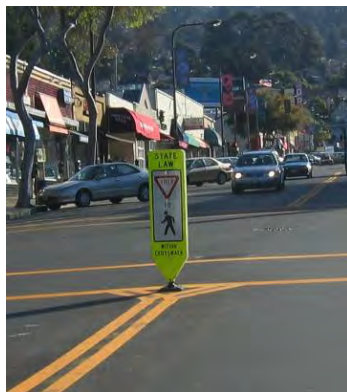
10.1 Warning Signage

Description

Pedestrian warning signage accompanies all pedestrian infrastructure improvements. Pedestrian warning signage may be placed on existing signposts (if appropriate) to reduce visual clutter.

At uncontrolled intersections with crosswalks, in-pavement paddles, pictured below to the left, may be warranted. These paddles are installed at the center stripe of the roadway on the leading edge of the crosswalk. Approaching motorists are warned to yield to crossing pedestrians.

Graphic



Examples of pedestrian warning signage

Potential Applications

- High pedestrian activity areas in denser urban cores and commercial districts.

Summary of Standards

- Pedestrian signs should be installed according to the guidelines set forth in the California MUTCD.
- Pedestrian crossing signs (W54) should be used adjacent to all controlled pedestrian crossing areas.
- One drivers-side sign is appropriate on two-lane lower speed roads.
- Two signs facing each direction should be installed on roads with more than two lanes, higher speed roads, or roadways with medians (with one sign on the median where medians exist, otherwise on the opposite side of the street).
- The color of all pedestrian crossing signs should be "Fluorescent Yellow-Green" per the MUTCD. A MUTCD revision (Final Rule Docket No. 96-9, RIN 2125-AD89) adopted the optional use of fluorescent yellow-green (FYG) for warning signs related to pedestrians, bicycle

and school applications.

- Pedestrian symbol signs (W54A) should be installed in advance of pedestrian crossings at isolated crossing areas. These signs are typically not used in urban areas at intersections or where motorists would normally expect pedestrians.

10.2 School Zone Signage

Description

Special considerations should be made for pedestrian facilities in school zones. School area signage and striping help alert motorists to be watchful for students. One way of increasing the visibility of pedestrian-related signage is through the use of a Fluorescent Yellow-Green (FYG) background. Use of this FYG signage is approved by the California MUTCD for use on pedestrian, bicycle and school signs. When the FYG background is used for corridor or school-area signing, a systematic approach should be used, so that the mixing of standard yellow and fluorescent yellow-green is avoided.

Graphic



Standard School Pedestrian Signage

Source: California MUTCD

Potential Applications

- All school zones.

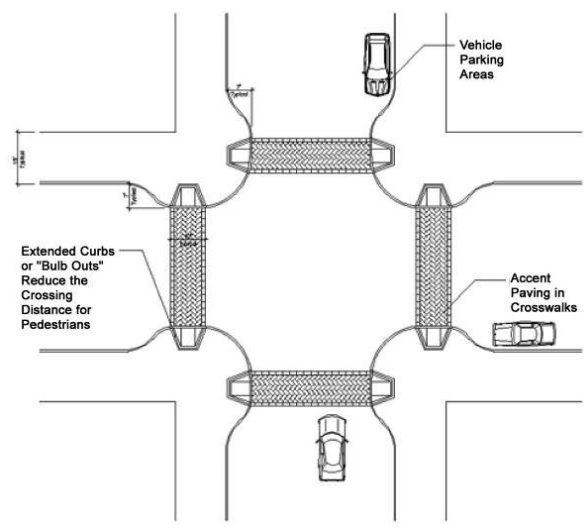
Summary of Standards

- Refer to 2006 California MUTCD for specific school zone signage types and placement standards.

11.0 DESIGN TREATMENTS FOR CROSSWALKS

11.1 Curb Extensions

Description
<p>Curb extensions, also called “bulb-outs” to describe their shape, are intended to reduce pedestrian crossing distance and increase visibility. Curb extensions increase pedestrian visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, also making them more visible to oncoming drivers. At corners, curb extensions serve to reduce the turning radius, and provide space for perpendicularly-aligned curb ramps. Where bus stops are located, bulb-outs can provide additional space for passenger queuing and loading.</p> <p>Despite their advantages, curb extensions can require major re-design of the street and are not appropriate or possible in some locations. Installing curb extensions where there are existing storm drain catch basins can require costly drainage modifications. Curb extensions may not be possible in some locations due to existing driveways or bus pull-out areas. Curb extensions need to be designed to avoid conflict with bicycle facilities, and should never extend into a bicycle lane.</p>

Graphic	Potential Applications
 <p style="text-align: center;"><i>Curb Extension Design</i></p> <p><i>Source: Alta Planning + Design, 2010</i></p>	<ul style="list-style-type: none"> • At corners or at mid-block crosswalk locations • Given their relatively high cost and challenges of implementation, curb extensions are not recommended as a tool for widespread implementation along every street in the city. • Each potential curb extension location must be evaluated on a case-by-case basis, taking into account factors such as crossing volumes, parking lane widths, infrastructure challenges such as drainage or driveways, turning impacts to large vehicles, and locations of bus stops.

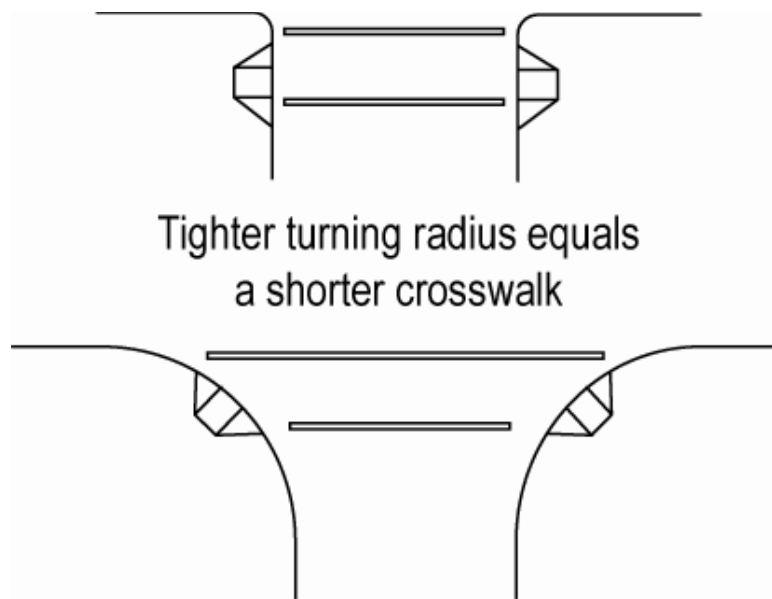
Summary of Standards
<ul style="list-style-type: none"> • Bulb-outs should generally extend out about 6 feet to align with the edge of the parking lane and must meet ADA curb ramp requirements.

11.2 Turning Radius

Description

A corner's turning radius determines how fast a driver can comfortably make a turn. A tighter turn or shorter radius forces drivers to slow down allowing them to see pedestrians better and stop more quickly. Intersection corners with short radii increase safety for pedestrians at intersections by creating more sidewalk space and less roadway space. A decreased curb radius also allows for curb ramps that are aligned parallel to crosswalks.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- Two and four-way intersections.
- Commercial driveways.

Summary of Standards

- A 10' turning radius is recommended for streets without curbside parking.
- For streets with curbside parking, a 20' radius is recommended.
- Streets with significant volumes of truck or large vehicle traffic should be analyzed and may require larger corner radii.

11.3 Median Refuge Islands

Description
<p>On wide, multi-lane roadways, pedestrians can benefit from median refuge islands, which offer a place to wait after crossing only half of the street. Refuge islands increase the visibility of pedestrian crossings, and decrease pedestrian collisions by reducing pedestrian/vehicle conflicts, motor vehicle speeds, and exposure time for pedestrians.¹ They also allow pedestrians to consider cross traffic from one direction at a time, making it easier to find a gap and simplifying crossing.</p>
<p>The MUTCD defines an island as an area between traffic lanes for control of vehicular movements or for pedestrian refuge. Under the MUTCD definition, a refuge island can be delineated by curbs (raised), pavement markings (painted), or other devices. The MUTCD does not give any specific guidance on minimum dimensions of a refuge island</p>
<p>For pedestrian refuge islands at intersections, installing a median nose can help to provide additional protection for pedestrians. Median noses can also reduce vehicles encroaching into the refuge area when making left turns. However, median noses may not be feasible to install due to turning movement restrictions they can cause from side streets. Neither the MUTCD nor the ADA Access Board Guidelines have any requirement for median noses to be installed at intersection refuge islands. The City of Chula Vista should consider median nose installation on a case-by-case basis.</p>

Graphic	Potential Applications
 <p style="text-align: center;"><i>Median Refuge</i></p>	<ul style="list-style-type: none"> • Wide, multi-lane roadways

¹ FHWA 2002b, p. 72

Summary of Standards

The FHWA document “Pedestrian Accommodations at Intersections” advises that a refuge island should be a minimum of 4 feet wide and 12 feet long (or the width of the crosswalk, whichever is greater).² The ADA Access Board’s Draft Guidelines on Accessible Public Rights-of-Way has a section on median islands.³ These guidelines have not yet been adopted, and as such are not ADA requirements at this time. However, the guidelines are under consideration for adoption in the future, and cities refer to these guidelines as best practices for compliance with future ADA standards.

The following right-of-way guidelines are recommended by the Access Board’s Draft Guidelines⁴:

- Medians and pedestrian refuge islands in crosswalks shall contain a pedestrian access route, including passing space connecting to each crosswalk.
- Regarding a minimum width for refuge islands, the guidelines state that medians and pedestrian refuge islands shall be 6.0 ft (1.8 m) minimum in length in the direction of pedestrian travel.
- The guidelines permit both ramped up and cut-through design of refuge islands, and advise that there are many factors to consider when deciding whether to ramp or cut-through a median or island. Those factors may include slope and cross slope of road, drainage, and width of median or island. They note that “curb ramps in medians and islands can add difficulty to the crossing for some users.”
- Medians and refuge islands are also required to have detectable warnings at cut-through islands.

² Pedestrian Accommodation and Intersections, FHWA,
http://safety.fhwa.dot.gov/ped_bike/univcourse/swless15.htm

³ <http://www.access-board.gov/PROWAC/draft.htm#305>

⁴ Access Board, Draft Accessibility Guidelines for Public Rights of Way, Section R305.4

11.4 Closing Channelized Right-Turn Slip Lanes

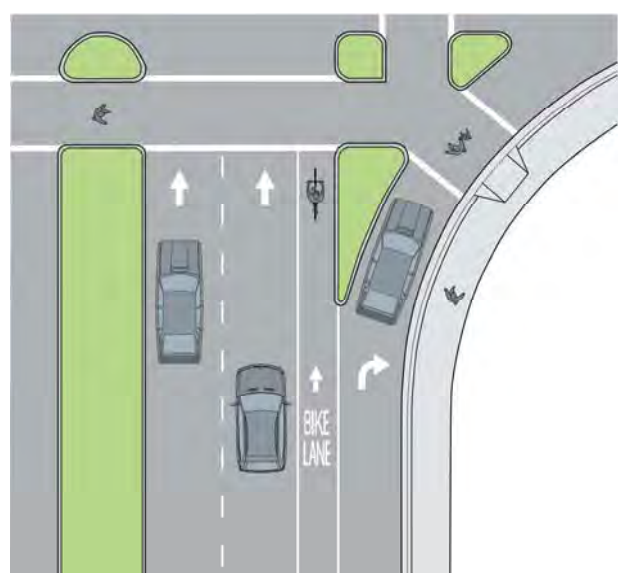
Description

A right turn slip lane, often delineated by paint or a concrete island, separates the right turn movement from through and left-turning vehicles.

Slip turn lanes can present difficulties to pedestrians because drivers tend to look left and concentrate on merging with oncoming traffic and may not see pedestrians entering the crosswalk. In high-traffic areas, inadequate gaps in right-turning traffic may exist, making crossing a slip turn lane difficult for pedestrians. The non-standard corner geometry introduced by slip lanes is extremely difficult for the blind to negotiate.

The closing of a slip turn lane solves the problems discussed above and also serves to shorten the pedestrian crossing distance. Further, the area can be made an attractive corner for pedestrians through the use of street furniture, benches, and small-scale plantings. Where slip turns cannot be removed due to traffic capacity considerations, several options exist for enhancing pedestrian safety. Signalizing the right turn movement creates gaps for pedestrians and may be the safest alternative. Passive crossing treatments, such as warning signage, or a raised crosswalk connecting the sidewalk with a refuge island, may also improve conditions for pedestrians.

Graphic



Slip Turn Crossing Treatment

Source: Alta Planning + Design, 2010

Potential Applications


- Intersections with free turning right lanes.

Summary of Standards

Intersections' unique geometries dictate dimensions and if a slip turn lane can be closed.

11.5 Raised Sidewalks

Description
The purpose of raised sidewalks is to eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street.

Graphic	Potential Applications
 <p><i>Midblock crossing with raised sidewalk</i></p>	<ul style="list-style-type: none">• Midblock crossings.• Multi-use trail and roadway intersections.

Summary of Standards
<ul style="list-style-type: none">• Approaches to the raised crosswalk may be designed to be similar to speed humps.• Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.

12.0 TRAFFIC SIGNAL ENHANCEMENTS

12.1 Signal Timing and Activation

Description

Traffic signal timing can have an effect on the ability of slower-moving pedestrians to safely cross the street. The length of the pedestrian clearance phase is determined by calculating a clearance interval, which is the length of time it takes a person to walk from the curb on one side to the center of the farthest travel lane on the other. The standard walking speed used to calculate pedestrian clearance intervals recommended by the California MUTCD is 4 feet per second. The Revised Draft Guidelines for Accessible Public Rights-of-Way, as published by the United States Access Board, recommend a pedestrian crossing speed of 3.5 feet/second for signal phase timing. Consequently, where there are populations of pedestrians who walk more slowly, a lower walking speed should be considered in determining the pedestrian clearance time. Where signalized crossings are in close proximity to locations such as senior centers, senior housing, elementary schools, or centers generating significant volume of pedestrians with disabilities, the City of Chula Vista should consider utilizing a walking speed between 2.8 and 3.5 ft/sec to allow for longer crossing times. This recommendation may also be applied to locations adjacent to elementary schools, as young children commonly walk more slowly.

Fully-actuated signals are highly responsive to local traffic variations because they detect vehicles and pedestrians as they arrive in the intersection on any approach. On fully-actuated signals, pedestrians are required to push the button to actuate the WALK phase in any direction.

Potential Applications

- Extended phase – At intersections with an extended phase, pedestrians who push the pedestrian crossing button get more time to cross the street than is provided during the normal signal phase.
- Leading Pedestrian Interval (LPI) – At intersections where there are conflicts between turning vehicles and pedestrians, pedestrians are given a “walk” designation a few seconds before the associated green phase for the intersection begins.

Summary of Standards

- California MUTCD walking speed used to calculate pedestrian clearance intervals is 4 feet per second.
- MUTCD recommends a walking speed of 2.8 feet per second for areas with slow walkers. All pedestrian signal placements will comply with Caltrans guidelines.

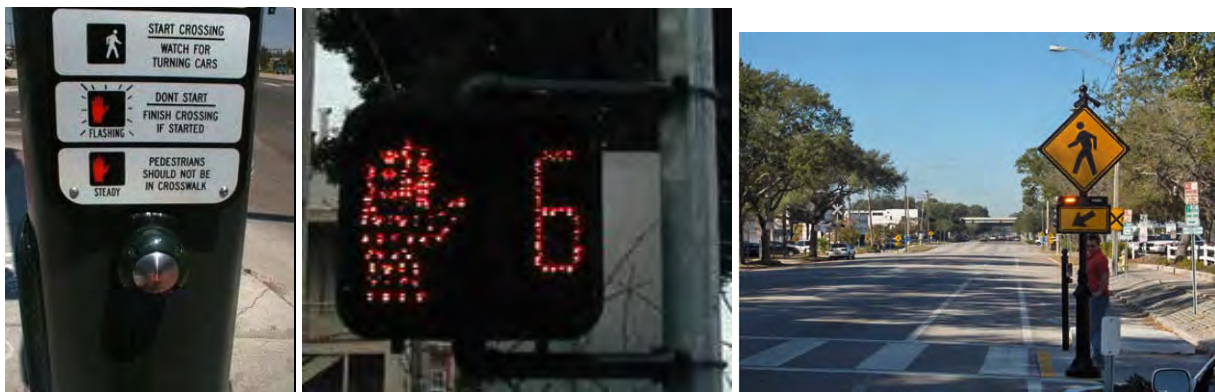
12.2 Pedestrian Pushbutton Signals

Description

Pedestrian signals ensure that pedestrians are given adequate time to cross the roadway and are not stranded in the crosswalk by signal lights with insufficient crossing time. Pedestrian push buttons, like the one shown below, should be accessible to people in wheelchairs and easy to find for the sight impaired. Depending on intersection configuration, location, and use, a variety of visual crossing indicators can be used.

One option for a pedestrian signal is a Rapid Flash LED Beacon (RFB). RFBs are experimental pedestrian actuated signals that operate similarly to overhead beacons currently used by many jurisdictions. What makes RFBs different is their stutter flash pattern, which is similar to that of emergency vehicles. Preliminary tests by the FHWA have found high rates of yielding to pedestrians by drivers.

Graphics



Pedestrian pushbutton, pedestrian countdown signal, RFB

Source: FHWA

Potential Applications

- All high volume signalized intersections where pedestrian crossings are permitted.

Summary of Standards

- Pedestrian push buttons should be located at the level top of the curb ramp cut, approximately 40 inches off the ground.
- Pedestrian pushbuttons should be located where sight impaired pedestrians can easily find them.
- Vibrotactile pedestrian signals should be provided wherever sight-impaired pedestrians are expected.
- All pedestrian signal placements will comply with Caltrans guidelines.

12.3 Pedestrian Detection

Description

Trip beam actuation systems can detect pedestrians entering the crosswalk, and in the case shown below, will trigger in-pavement flashers. Systems like this one with “passive activation” may be less disruptive to traffic flow, because pedestrians will usually wait for a gap in traffic before entering the crosswalk.

Graphic



Passive activation in pavement flashers

Potential Applications

- Midblock crossings with significant motor vehicle and pedestrian traffic.
- Crossings with poor visibility due to the lack of lighting or other obscuration.


Summary of Standards

- Not applicable on major intersections and roadways.
- If specific local circumstances allow, midblock crossing treatment should be considered.

13.0 PAVEMENT MARKINGS

13.1 Stop Lines

Description
<p>Stop lines (commonly referred to as limit lines or stop bars) are solid white lines that indicate where traffic must stop at STOP-controlled or signalized locations. Stop lines are only required at controlled locations where no marked crosswalk exists. Where a crosswalk is present, the crosswalk itself can function as the stop line. Jurisdictions are permitted by the MUTCD to install a stop line in advance of a marked crosswalk if they desire.</p> <p>Installing stop lines in advance of crosswalks can help to discourage vehicle encroachment into the marked crosswalk, particularly in right-turn-on-red situations where vehicles often creep forward to get better visibility. One solution to this issue is to stripe a stop line on the left lanes farther back than the right lanes, allowing better visibility to the left for right-turning vehicles. This also allows more clearance for vehicles turning from perpendicular streets. A supplement to Stop Lines is “STOP HERE ON RED” signage with a down arrow indicating the stop line as the proper location for vehicles to stop in advance of the intersection.</p>

Graphic	Potential Applications
 <p><i>Advanced stop line</i></p>	<ul style="list-style-type: none"> Controlled or signalized intersections. At locations that have a history of vehicle encroachment into the crosswalk or vehicles failing to stop for pedestrians on right-turn-on-red, the City may consider installing stop lines at least 4 feet back from the crosswalk. At mid-block pedestrian crosswalks with flashing beacons, the City may consider the installation of stop lines at least 4 feet in advance of the signal indication.

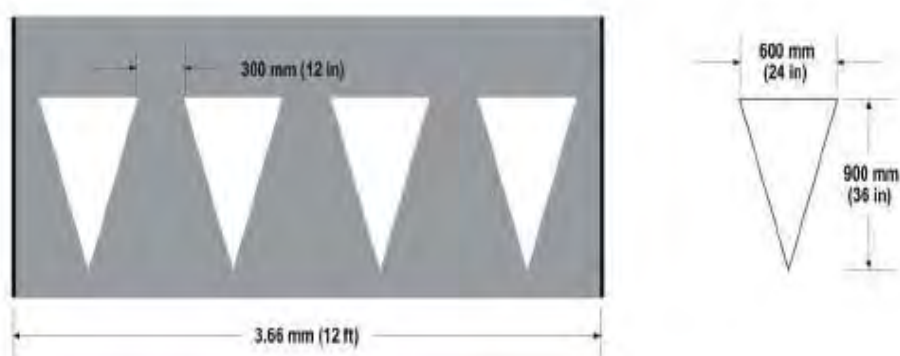
Summary of Standards
<ul style="list-style-type: none"> The use of Stop Lines is guided by California MUTCD Sec. 3B.16. Solid white line 12 inches to 24 inches wide.

13.2 Yield Lines

Description

Yield lines (also called yield teeth or shark's teeth) indicate the point at which traffic should yield at uncontrolled locations. In California, vehicles are required to “YIELD” to pedestrians in uncontrolled crosswalks, and yield lines can be used to indicate the appropriate location for vehicles to stop in advance of an uncontrolled crossing location. These markings are most effective in mid-block locations, where there is no intersection to give a motorist cues on the location to wait for a crossing pedestrian.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- Mid-block crossing locations.
- On multi-lane roadways, yield lines can be used to counter the “multiple-threat” collision, which refers to the situation where a car in one lane stops and screens the pedestrian from the view of the adjacent lane.

Summary of Standards

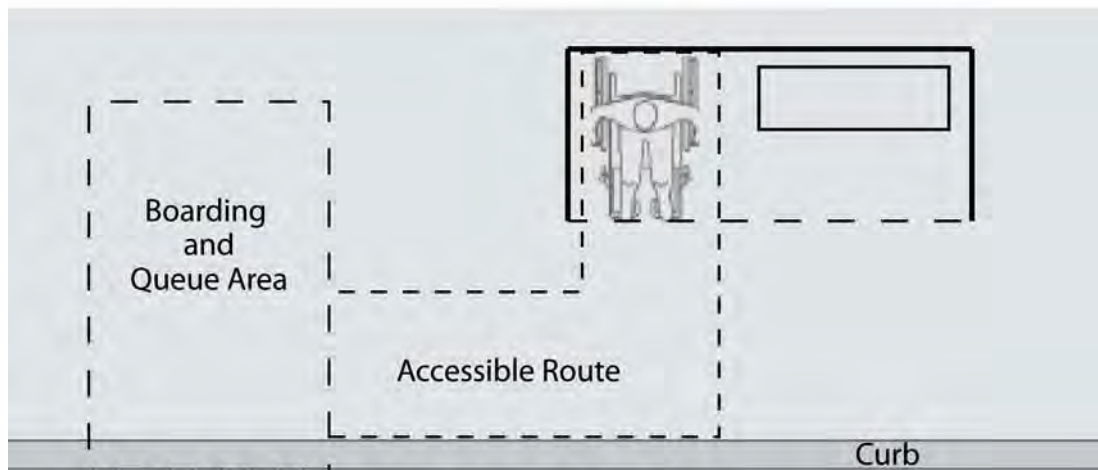
- Yield line placement should be 20 to 50 feet back of uncontrolled mid-block intersections. The use of Yield Lines is guided by California MUTCD Sec. 3B.16.
- Installing yield lines 40-50 feet back (two car lengths) gives both pedestrians and motorists a better view of each other during the crossing. “YIELD HERE FOR PEDESTRIANS” signs with a down arrow can be used at the yield lines to indicate the proper location for vehicles to yield in advance of the crosswalk.
- White triangles are 3 feet high by 2 feet wide and spaced 1 foot apart.

14.0 TRANSIT STOPS

Description

Bus bulb-outs can provide safe access for transit passengers and provide additional space at bus shelters on crowded sidewalks (See the explanation of bulb-outs on page 28). Bus bulb-outs should be designed such that pedestrians in wheelchairs can access the bus shelter and board the bus. At transit stops where neither a bus turnout nor bus bulb-out can be accommodated, buses are often unable to pull in directly adjacent to the curb to deploy a lift. Curb ramps in such locations allow wheelchair users to board the bus from the street; if a bus stop is not adjacent to a corner curb ramp, a curb ramp at the bus stop should be provided. Bus shelters should also have clearly displayed bus schedules and city maps for way-finding. Pedestrian facilities around all street furniture should meet accessibility requirements and pedestrian walk clearance zones.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- All transit stops.

Summary of Standards

- Transit stops must make accommodation for persons with disabilities under the ADA; designs vary.

15.0 PEDESTRIAN TRAILS

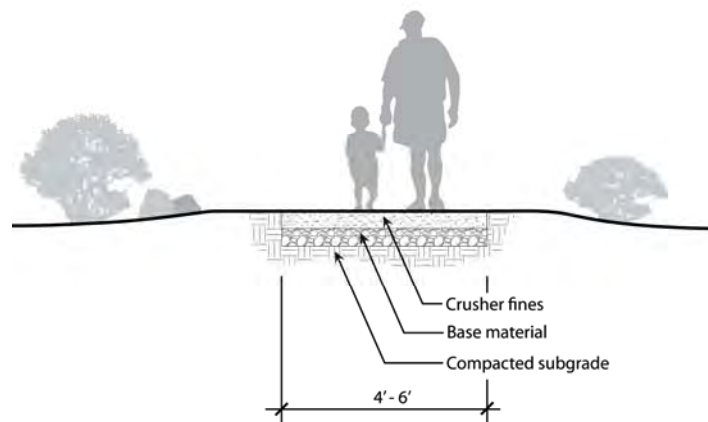
15.1 Pedestrian Trail Design

Description

Pedestrians are the most mobile trail user. They are able to walk on trails that have a variety of surface stabilities, although compacted earth, gravel, or concrete surfaces offer the preferred level of stability. The trail design should consider the ability of the desired pedestrian. Pedestrians that use a wheelchair or other mobility assistance device require a paved surface that complies with ADA standards. In contrast, physically fit pedestrians may require little more than a two foot clearing of semi-packed earth, though a minimum width of four feet is recommended.

The required easement for a trail can vary, but 20 feet is preferred to allow the greatest flexibility in trail placement. The minimum recommended easement width is five feet.

Graphic



Source: Alta Planning + Design, 2010

Potential Applications

- Neighborhood pathways.

Summary of Standards

- Four to six foot wide path.
- Eight foot vertical clearance.
- Grades meet 5% or less where possible. 10% maximum with terraced steps (on non-compliant ADA trails).
- Cross-slopes should not exceed 8% to prevent erosion.
- Gravel surface (crusher fines) or compacted/stabilized earth.

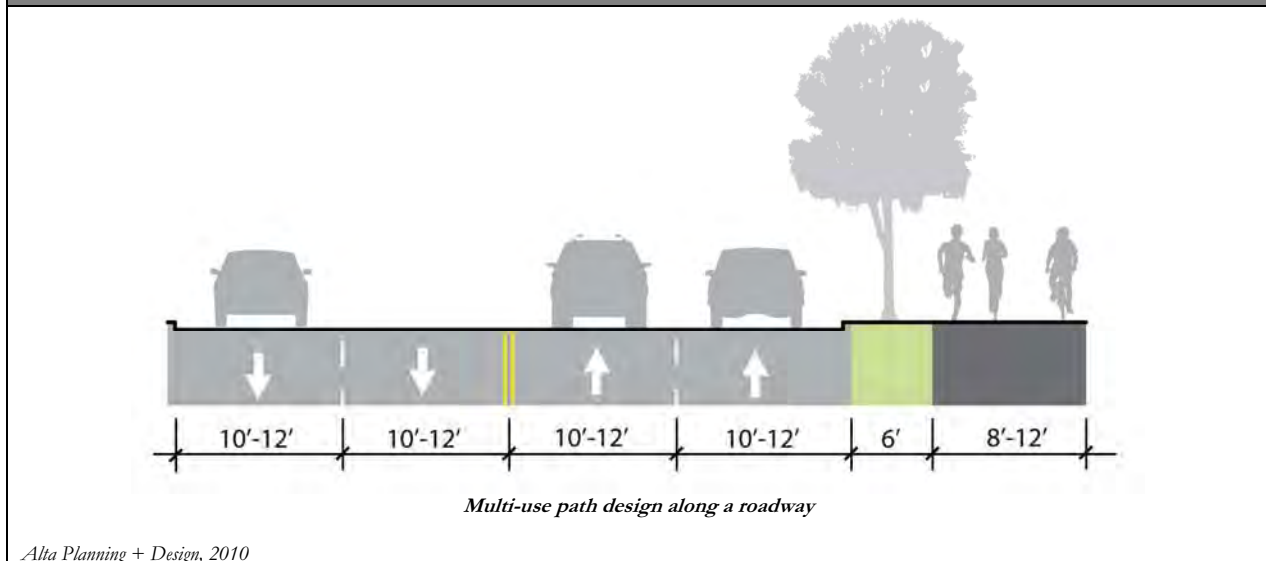
15.2 Multi-Use Path Design

Description

Multi-use trails along roadways provide a facility separated from the roadway with a buffer. These facilities are typically preferred among recreational bicyclists who are intimidated by riding their bicycle directly adjacent to automobile travelways. Pedestrians typically prefer separated paths over sidewalks because the buffer provides an added sense of safety from traveling automobiles.

A minimum of an eight foot trail width is required if bicyclists and pedestrians will be using the path. Additional width provides room for bicyclists to pass other path users. Eight foot vertical clearance is also recommended to accommodate bicyclists. California Highway Design Manual Chapter 1000, and the AASHTO Guide caution that multi-use paths adjacent to roadways require special consideration however, if well-design, can be a valuable facility for pedestrians and bicyclists.

Graphic



Potential Applications

- Areas with high pedestrian and bicycle demand and sufficient right-of-way.

Summary of Standards

- Eight feet is the minimum allowed for a two-way multi-use path and is only recommended for low traffic situations.
- Ten feet is recommended in most situations and will be adequate for moderate to heavy use.
- Twelve feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians.
- Eight foot vertical clearance required, with 10 foot clearance recommended.
- Vertical obstructions, such as fences and signs, adjacent to multi-purpose trails shall be a minimum of two feet from the edge of the trail to provide clear space for bicycle handlebars.

- Longitudinal grades of 5% or less, 2-3% preferred when possible.
- Cross slopes of 2% or less.
- Paved.
- Wash crossing paved with concrete, including rock or culverts underneath, to allow water to flow under in flood events.
- Parallel swale on both side of the trail to capture runoff and create a habitat for trailside planting.
- Seating and interpretive features at key points along the path are desirable.

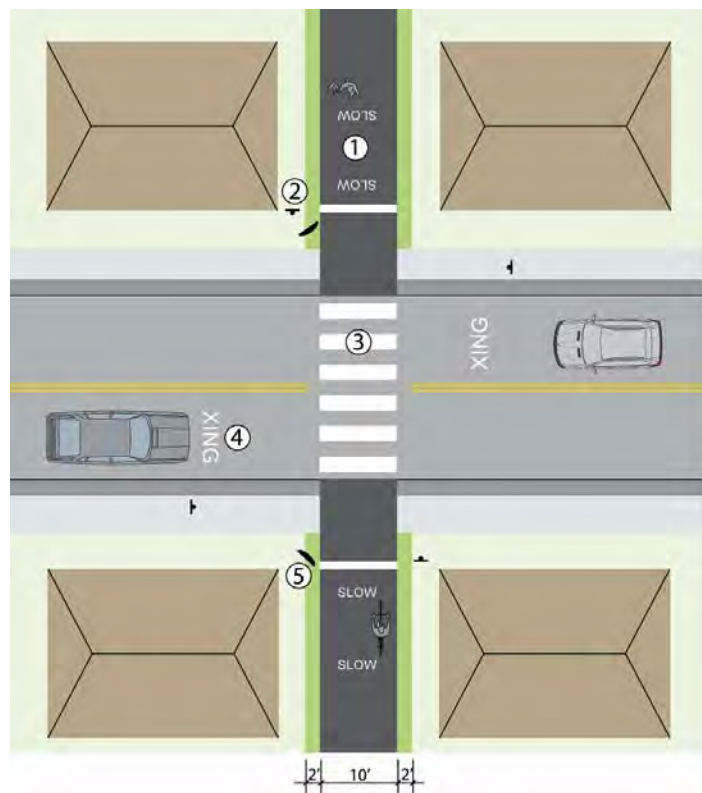
15.3 Multi-Use Trail Intersections

Description

Paths may cross roadways either at-grade or grade-separated. At-grade crossings pose the greatest risk to path-users for encountering a conflict with automobiles. These crossings force users to wait for gaps in oncoming roadway traffic to cross, which can be uncomfortable to many users, and may even discourage them from using the trail. Fortunately, many roadway crossings can be designed to increase the safety of the user and their comfort level.

Grade-separated crossings provide the most safety and comfort for the users. However, they can be very expensive. Only where other traffic control measures have failed, where there are very high volumes and speeds of traffic, or where topography lends itself, should grade-separated crossings be considered.

Graphic



Source: Alta Planning + Design, 2010

Possible Elements

- Path warning markings and warning stripe
- Yield sign (MUTCD R1-2)
- Striped crosswalk
- Roadway markings
- Mirrors to provide better sight distances

The graphic to the left is a diagram of a trail/path roadway crossing. Mirrors are provided to increase the sight distance for both the path user and the motorist. The path is marked with a warning stripe and markings before the user approaches the roadway. Where the path crosses the roadway at mid-block, and no traffic controls are installed, a striped (ladder) crosswalk should be used. Roadway traffic is warned of the upcoming path crossing with pavement markings and signage.

Summary of Standards

- The evaluation of a roadway crossing involves analysis of vehicular traffic and trail user travel patterns including, speeds, street width, traffic volumes (average daily traffic, peak hour traffic), line of sight, and trail user profile (age distribution and destinations).

- Roadway crossings should comply with the AASHTO Guide for the Development of Bikeway Facilities and “A Policy on the Geometric Design of Highways and Streets,” and the California MUTCD.

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